

Figure III.A.3

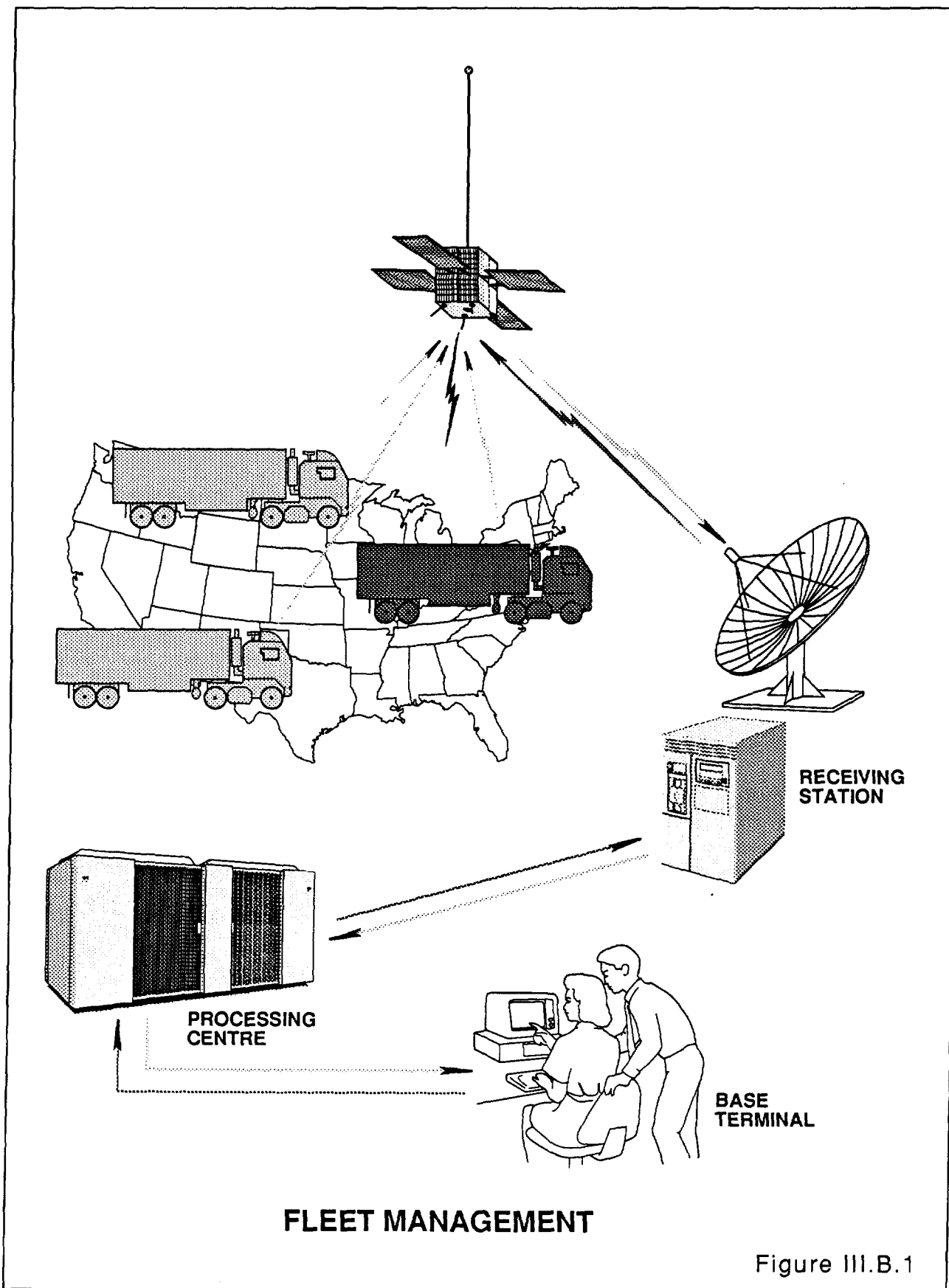
requirements. However, small outfits have a difficult time justifying the multi-thousand dollar expense of a geostationary satellite system. The STARNET system proposed herein can readily fill this niche as a "just-in-time" telecommunications technology for the smaller factories and transport firms in America (see Figure III.B.1).

It is important to recognize that STARNET is not competitive with the Geostar, Locstar, Qualcomm or Rockwell RDSS and LMSS systems. Products selling for \$75 (STARNET) and \$4000 (others) are geared to entirely different market segments. The geostationary systems are designed for regular, hourly use, with messages up to 24,000 characters (10 pages typed) long. STARSYS, Inc. is, however, directly competitive with Argos and Orbital Communications Corporation, both of which are targeted at low rate use and very inexpensive user terminals.

2. Impact of Mobile Communications on Transport

The impact of mobile communications on transport has been documented in numerous studies. Both Geostar and Qualcomm have reported publicly that transport users of their systems save enough money to recover the \$4-5,000 user terminal cost in about one year. These savings include avoiding wasted time and fuel from making unnecessary trips, waiting at phone booths to check in with the dispatch center, and driver recruitment and retraining costs. Driver retraining is expensive in the transport sector because 100% employment turnover rates per year are common. Rather surprisingly, transport vehicles equipped with mobile communications have shown much lower driver turnover than the same class vehicles without two-way radio.

Research has also shown that regardless of the economic benefits of mobile communications systems, transport sector business managers will not spend much more than 5% of vehicle costs on telecommunications. This relatively low statistic may reflect the brief tenure of a vehicle in the typical transport sector fleet - often



less than three years and rarely more than five. In any event, a large market segment exists among small, low-end transport sector vehicles, such as those costing under \$20,000. Geostationary satellite systems are not projected to reach \$1,000 (5% of vehicle costs) even in their follow-on stages, implying an entirely separate market segment for LEO MSS systems such as STARNET. This serves the public interest by ensuring broad, democratic access by all strata of the transport sector to the benefits of mobile communications.

3. The Public Interest Is For The Public To Get The Most Cost-Effective Service, Not For Hardware Suppliers To Get A Protected Market

It is important to recognize that the public interest refers to the general public, and not to the business interests of any particular company or companies. Sometimes it is easy to confuse the definition of "who is the public." A time-honored guideline is that the more people that are benefiting, the more likely that the "public interest" is being served.

The STARNET system design is the most cost-effective design for LEO MSS that has ever been proposed. Furthermore, the extensive decade-long experience LEO operating experience of Applicant makes it much more likely that the proposed system will actually be implemented. Most unexperienced satellite applicants have ended up turning their licenses back in to the FCC. Finally, the private satellite operator regulatory structure requested by Applicant has been shown to produce the most market-responsive mix of telecommunications products and services. Hence it seems likely that the beneficiaries of STARNET will be a very broad and general public.

C. THE STARNET SYSTEM WILL FURTHER THE DEVELOPMENT OF A FREE AND OPEN GLOBAL MARKET IN TELECOMMUNICATIONS SERVICES

The STARNET system would be the world's first satellite system that is generally available worldwide. Furthermore, the private satellite regulatory structure applied for herein permits an unlimited array of possibilities for the "packaging" of LEO MSS service as part of other products or services. This same structure permits nearly all types of separate or interrelated national arrangements for the delivery of STARNET service to end users. As such, the STARNET system could make an historically unique contribution to the development of a free and open telecommunications services.

D. THE STARNET SYSTEM WILL PROVIDE AN INFRASTRUCTURE FOR GREATER GLOBAL ECONOMIC INTEGRATION

It is fundamental to our economic system that greater global economic integration is in the public interest. The reason for this is that the public then gets its "pick of the world" in obtaining the most cost-effective goods and services. Since the STARNET system is uniquely able to provide an integrated telecommunications link anywhere in the world, it is a key infrastructure system for the globe-circling enterprises of the 1990s and beyond.

1. As an Inherently Global System, STARNET will Help Multi-national Companies Integrate Their Operations

Recent studies have shown that multinationalism is the trend in modern business. Ever-increasing numbers of U.S. companies obtain more than 50% of their profits from overseas operations. STARNET will be extremely valuable to such firms since it enables employees or company property to be linked with a simple, ultra-low-cost radio, regardless of location, anywhere in the world. This unique capability of STARNET is in the public interest by providing multi-national companies with a basic business productivity tool that is not

otherwise available today.

2. As the Volume of Global Shipping Increases, the World Needs More Communications Technology

The level of communications equipment adequate for a lower level of global transport activity is not going to be sufficient as that volume rises significantly year after year. Although the volume of international shipping has more than doubled during the past ten years, Inmarsat has remained the only source of globally operable mobile communications technology. Even with Inmarsat, "globally operable" has generally referred only to marine areas, and only with extremely expensive user equipment. The public interest will benefit from the introduction of a new, low-cost, globally operable mobile communications system.

E. THE STARNET SYSTEM IS AN EXTRAORDINARILY EFFICIENT USER OF THE FREQUENCY SPECTRUM

Efficiency of frequency spectrum utilization is a very important measure of service to the public interest. With the useful radio bands so limited and congested, any non-efficient use should be — and traditionally have been — discouraged. See, e.g., Licensing of Space Stations in the Domestic Fixed-Satellite Service, 54 R.R.2d 577 (1983) ("Reduced Orbital Spacing"), recon. in part 57 R.R.2d 653 (1985). By this yardstick, the STARNET system represents one of the most efficient uses of the electromagnetic spectrum that has ever been proposed to the Commission. Its ratio of potential users to hertz of spectrum is much greater than one. For example:

SPECTRUM EFFICIENCY = CAPACITY FOR USERS

HERTZ OF SPECTRUM

SPECTRUM USER

SPECTRUM EFFICIENCY RATIO

LEO MSS	40 Million Terminals/2 Million Hertz = 20
BROADCASTING	250 Million TV Sets/66 Million VHF Hertz = 4
CELLULAR	20 Million Phones/78 Million UHF Hertz = 0.25
AMSC	1.5 Million Users/30 Million L-Band Hertz = 0.05

As the above table indicates, the public interest in spectrum efficiency should certainly favor STARNET by comparison with other familiar radio systems.

**F. THE STARNET SYSTEM'S PRIVATE SATELLITE OPERATOR
STRUCTURE WILL ENHANCE COMPETITIVENESS AND MARKET
RESPONSIVENESS IN THE MOBILE COMMUNICATIONS BUSINESS
SECTOR**

The public interest is clearly served when the incentives for competition and market responsiveness are present. The private non-common carrier structure proposed herein will enable a maximum amount of market responsiveness within LEO MSS capabilities. Since the entire capacity of the STARNET system will be sold to organizations which operate directly in STARSYS, Inc. markets, such capacity will be delivered to the end-users by those firms most in tune with market requirements. For example, Applicant believes that automobile manufacturers will be a primary STARNET bulk capacity purchaser for the LEO MSS automotive market.

The promotion of competition is fundamental to United States telecommunications policy. The Commission has taken numerous actions to introduce competition in the provision of international and domestic communications services. The multiple public interest benefits most

frequently touted by the Commission, as well as the courts, include: improving service and enhancing the economic and efficient provision of communications services, providing users with increased choice (and thereby fostering the provision of technically superior service to customers), enhancing the efficient use of facilities, producing downward pressure on costs and rates for specific services, and encouraging more equipment manufacturers to enter the market. See, e.g., FCC v. RCA, 346 U.S. 86, 96 (1952); Domestic Communication Satellite Facilities, 22 F.C.C.2d 86 (1970); 35 F.C.C.2d 844, recon. in part, 38 F.C.C.2d 665 (1972); Domestic Fixed-Satellite Transponder Sales, 90 F.C.C.2d 1238 (1982), aff'd sub nom. Wold Communications, Inc. v. FCC, 735 F.2d 1465 (D.C. Cir. 1984); Establishment of Satellite Systems Providing International Communications, 101 F.C.C.2d 1046 (1985).

Experience has repeatedly shown that when operators are freed to price and package services with a minimum of regulatory restraint, in a market as competitive as the mobile satellite communications market promises to be, there is almost no limit to the variety of services and offerings that can and will be made available. Applicant believes that with its private, non-common carrier structure, it is uniquely positioned to maximize the public interest benefits that are attainable with the multi-market technologies that are embodied within and represented by its STARNET system.

PART IV

THE STARNET SYSTEM COMPLIES WITH DOMESTIC AND INTERNATIONAL LEGAL REQUIREMENTS

The STARNET system is designed to comply with all domestic and international legal requirements. In particular, domestic satellite and FCC policies are supportive of the regulatory approvals requested herein. Also, international treaty obligations are consistent with the service capabilities Applicant proposes to offer.

A. STARCOM'S CONTEMPLATED PRIVATE SATELLITE OPERATOR STRUCTURE IS FULLY CONSISTENT WITH THE COMMISSION'S TRANSPONDER SALES DECISIONS

Applicant's proposal to sell the capacity of its LEO MSS satellite system to users on a non-common carrier basis, in the manner described above, is fully consistent with Commission precedent, and will serve the public interest, convenience, and necessity. The first applications for authority to sell satellite capacity were granted by the Commission in 1982 to satellite operators in the domestic fixed-satellite service. Domestic Fixed-Satellite Transponder Sales, 90 F.C.C.2d 1238 (1982) ("Transponder Sales"), aff'd sub nom. Wold Communications, Inc. v. FCC, 735 F.2d 1465 (D.C. Cir. 1984).

Noting that "it is desirable to permit closer planning between the [satellite] operator and its customers[.]" the Commission stated that the transponder sales transactions would serve the public interest by, inter alia, providing sellers and prospective entrants with an alternative means of securing the large amounts of capital necessary to construct satellite facilities; by providing a device to share the risks peculiar to satellite technology; and a gauge by which to predict with some precision the demand for more efficient orbital and frequency spectrum usage by providing sellers with the ability to design satellite systems to meet particular user needs. Transponder Sales, 90 F.C.C.2d at 1251-52. It concluded by finding that "the certification of non-common carrier

domsat systems is consistent with our policies fostering multiple satellite entry." Id. at 1255.

In subsequent transponder sales decisions, the Commission approved satellite operators' applications for authority to sell a satellite's entire complement of transponders to a single purchaser, and for authority to enter into a long-term transponder lease with an alien corporation. The Commission also applied the public interest rationale for domestic transponder sales, without caveat, to the proposals of international satellite system customers. See Hughes Communications, Inc., 94 F.C.C.2d 866 (1983) (Commission authorizes SBS to lease 5 transponders on the SBS III to British company; Section 310 foreign ownership requirements ruled inapplicable to non-licensee); Establishment of Satellite Systems Providing International Communications, supra, 101 F.C.C.2d at 1082.

Applicant's proposal to sell its STARNET system space segment capacity is fully consistent with the Commission decisions summarized above. Although the sales contemplated by Applicant will not technically be "transponder sales" due to the configuration of the LEO MSS system, but will instead be capacity sales in "Million Transmission" units, the bulk sale features of the proposal are identical in all salient respects to the features of the transponder sales proposals the Commission has approved in the past.

In addition, the private sales program envisioned by Applicant for its STARNET system will engender all of the public interest benefits to be realized by transponder sales. Such sales will permit Applicant to make tailored and flexible arrangements with its customers that are not possible under the regimen of a tariffed service offering; they will enable STARNET customers to make long-term plans for the use of the system with assurance as to the continued availability of the facilities and stability of price; transceivers and other system components will be able to be customized to meet idiosyncratic customer needs; and the direct and continuing contact between Applicant and its customers will stimulate the development of new and innovative service offerings. See Establishment of Satellite Systems Providing International

Communications, supra, 101 F.C.C.2d at 1082.

In short, Applicant, by requesting authority to offer its STARNET system capacity on a private, non-common carrier basis; by stating its intention to offer for sale all of the capacity on its system; and by stating outright that it is not and will not indiscriminately hold itself out to serve the user public within the parameters of the NARUC I decision, National Association of Regulatory Utility Commissioners v. FCC, 525 F.2d 620 (D.C. Cir.), cert. denied, 425 U.S. 992 (1976), has now made all of the showings required of applicants for satellite systems' space segment capacity on a non-common carrier basis. See Martin Marietta Communications System, Inc., 60 R.R.2d 779 (1986).

For all of these reasons, the Commission should, when it grants these applications, grant Applicant the authority necessary to allow it to sell the STARNET system capacity as proposed herein.

B. FCC ASSISTANCE IS REQUESTED TO OBTAIN FREQUENCY ALLOCATION AMENDMENTS AT THE 1992 WARC

The frequency bands requested by Applicant are allocated by the International Telecommunication Union for satellite services. However, the allocation does not specifically contemplate the generalized mobile satellite services proposed in this Application. Accordingly, Applicant requests the assistance of the FCC in amending the allocation table restrictions at the upcoming 1992 World Administrative Radio Conference (WARC). Specifically, Applicant requests FCC support to include Mobile Satellite Service (Low Earth Orbit) in the 137-138 MHz and 148-149 MHz bands.

PART V

FREQUENCY AND ORBITAL JUSTIFICATIONS

A. FREQUENCY BANDS

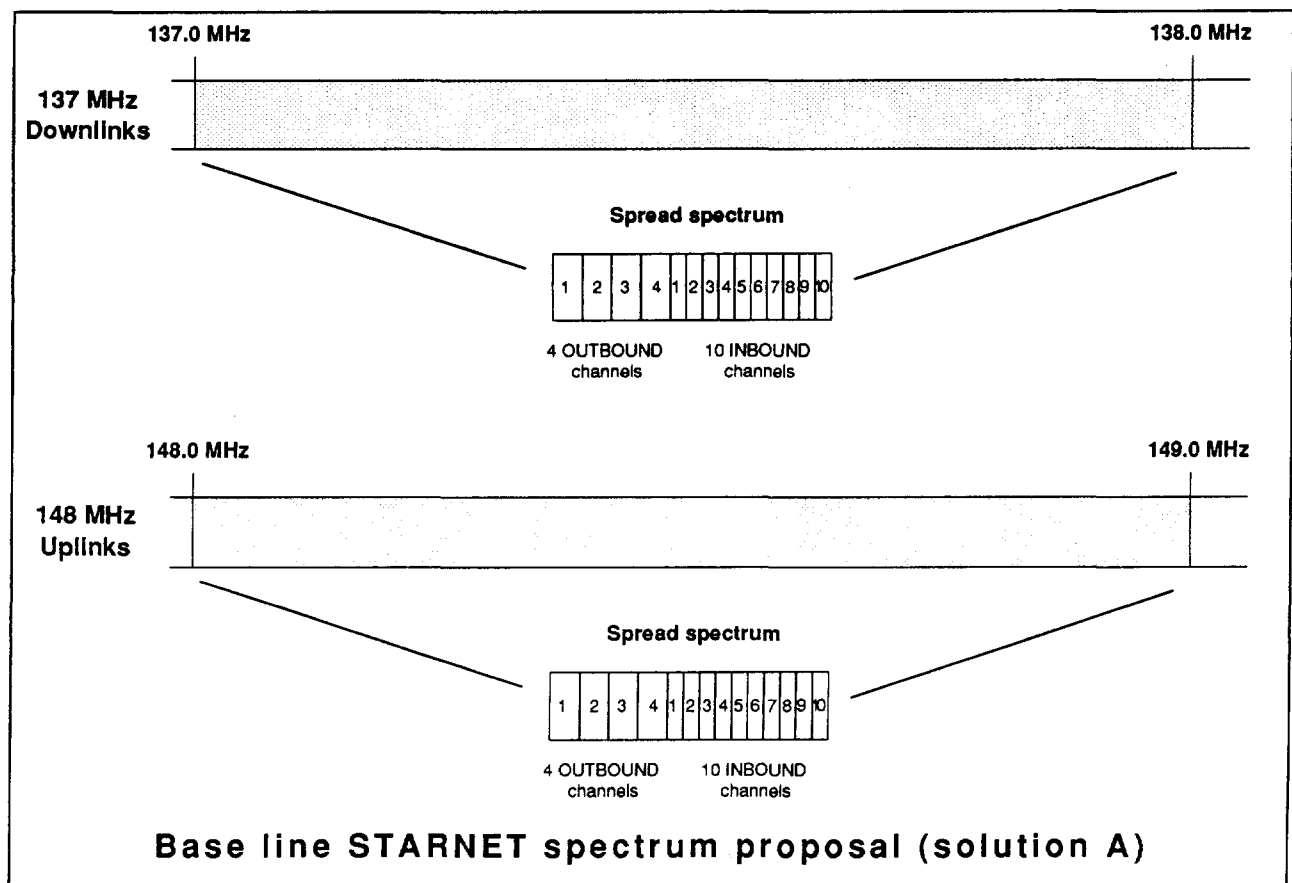
The complete frequency plan is discussed in Part VII-A.

1. SPECTRUM ALLOCATION

STARSYS, Inc. is requesting authorization to operate on a Modified Primary Basis in the U.S. on the following VHF bands:

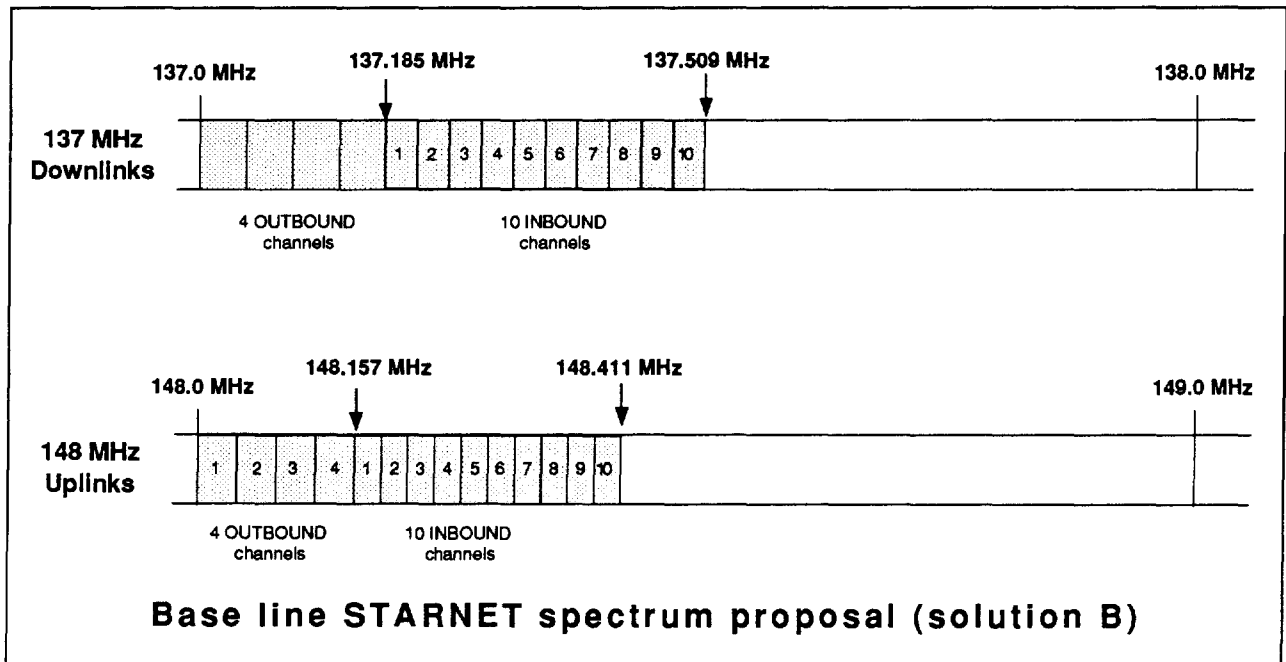
Nominally using spread spectrum techniques (solution A)

Earth to space (uplink)	148	to	149.0 MHz
Space to earth (downlink)	137	to	138.0 MHz



Or, alternatively, without using spread spectrum techniques (solution B)

Earth to space (uplink)	148	to	148.411 MHz
Space to earth (uplink)	137	to	137.509 MHz



The "Modified Primary" basis is such that the proposed system will not cause interference to presently authorized users in the same band and would be granted Primary Status against any new services.

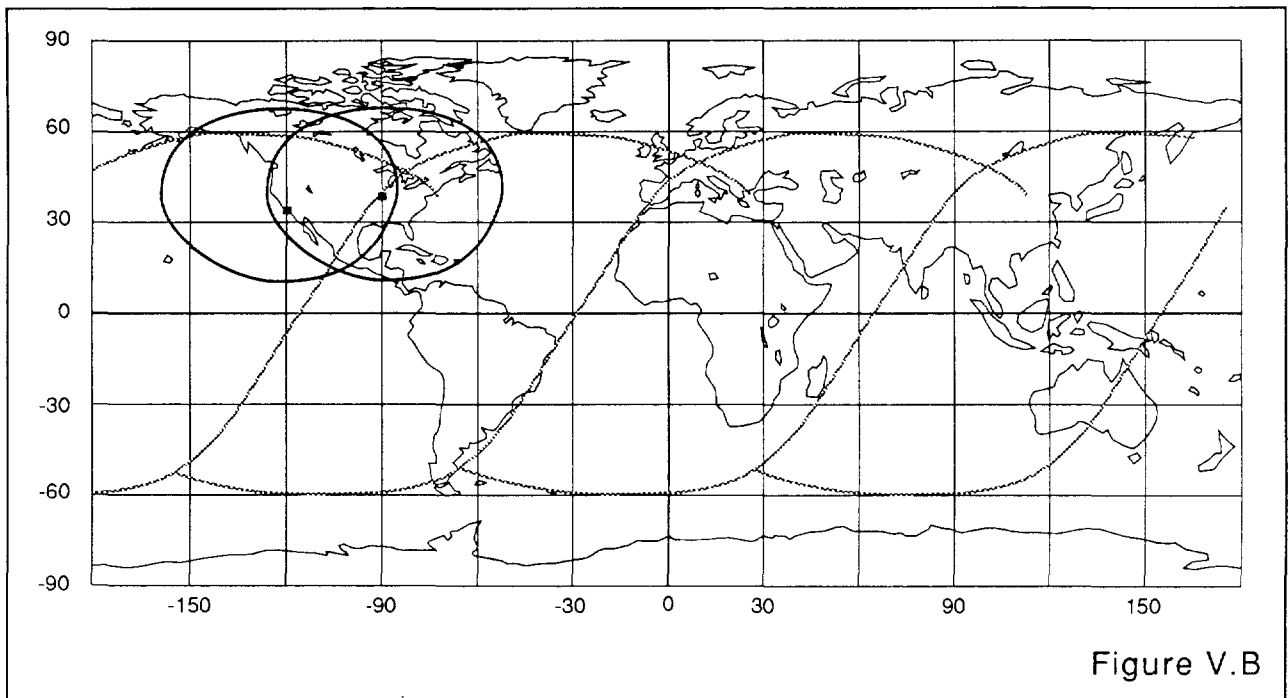
B. ORBITAL PLANES

System coverage is detailed in Part VII - A.4 Orbital Network Coverage Network (see Figure V.B).

The Basic Orbital characteristics:

- LEO satellites at 1300 km (700 nmi) orbit altitude to provide a wide real-time coverage and the possibility of a world-wide service;

- 60° orbit inclination angle, optimized for the North American continent and still able to cover the polar zones;
- Randomly distributed orbital planes and non phased orbits to decrease spacecraft cost (no orbit control), as well as operational costs;
- Permanent coverage of the North American continent with a less than two minutes off-view time with the full system deployed.



PART VI

LEGAL AND FINANCIAL QUALIFICATIONS

Applicant demonstrates within this Application its full legal and financial qualifications to hold an FCC license for LEO MSS.

A. APPLICANT IS LEGALLY QUALIFIED TO BE A COMMISSION LICENSEE

STARSYS, Inc., the Applicant, is a newly-established Delaware Corporation whose primary purpose is to build, launch and operate a low earth orbit mobile satellite system to serve the U.S. public interest, including compliance with the requirements of the Communications Act of 1934. STARSYS, Inc. came into being from the experience its affiliate-corporations have gained in the past decade in operating low earth orbit mobile satellites. In particular, CLS, a French corporation, and its American affiliates, NACLS and Service Argos, have been the domestic and global leaders in developing this technology for scientific applications.

In deciding to bring to the American public the expertise these companies have developed, much care has been taken to structure STARSYS, Inc., so as to make use of the decade-long experience of its affiliates, and yet conform to the requirements of Section 310 of the Communications Act of 1934. Accordingly, STARSYS, Inc., will be led and controlled by U.S. citizens. By its Articles of Incorporation and its By-laws, the majority of STARSYS, Inc.'s Directors will be elected U.S. citizens. A majority of the members of its Board of Directors will always be U.S. citizens and independent of affiliate corporations. Appendix 6 to this Application contains the Articles of Incorporation for STARSYS, Inc.

FCC Form 430, Appendix 1 hereto, provides all the information necessary to demonstrate that Applicant is legally qualified to be authorized by the Commission to construct the STARNET system. Insofar as Applicant will

be authorized as a private satellite operator (non-common carrier), Section 310(b) of the Communications Act is inapplicable to its proposal. Accordingly, pursuant to the Commission's decision in Establishment of Satellite Systems Providing International Communications, *supra*. 101 F.C.C.2d at 1164, Applicant has not responded to those questions on FCC Form 430 requesting information required by Section 310(b). Applicant, however, will supply any such information that the Commission deems necessary.

Individual applications for the spacecraft that comprise Applicant's STARNET system are included in Appendix hereto.

B. APPLICANT IS FINANCIALLY QUALIFIED TO BE A COMMISSION LICENSEE

Applicant has carefully studied the capital costs, operating expenses, revenue requirements and sources of funds for its proposed STARNET system. These financial parameters are summarized below. Appendices 3 and 4 demonstrate Applicant's affiliate's qualifications as the operator, for eleven years, of the sophisticated ARGOS LEO MSS system, with over 13,000 user terminals registered and many millions of dollars of system investment and market development. Shareholders of Applicant's affiliates include some of the largest banks in the world.

1. Capital Investment Costs

SEGMENT	UNIT COST	NUMBER	TOTAL COST	COMMENTS
Space	\$4M	26 Sats	\$104M	112 kg (247 lbs) Per Satellite*
Space	\$3M	24	\$72M	24 Launches
Space	\$0.3M	24 Ins. Pr.	\$8M	10-15% Rates
Control	\$4M	2 PACC	\$8M	Primary/Back-Up
Control	\$1M	2 Regional	\$2M	US Network
User	\$3M	1 Time NRE	\$3M	R&D; Tooling
TOTAL			\$197M**	

Launches shall occur at the rate of three satellites per quarter, commencing 40 months following FCC approval, until 24 satellites have been launched 64 months following authorization.

**Expenditures are at the rate of 10% Year 1 (year of FCC approval), 20% Year 2, 20%, Year 3, 20%, Year 4, 20%, Year 5, 10% Year 6.

The capital costs of Applicant's proposed STARNET system consist of space segment, control segment and user equipment development expenditures. The sum of these expenditures has been projected to be approximately \$197 million.

2. Operating Expenses

Operating expenses for the STARNET system consist of payroll, general, and administrative expenses associated with maintaining the satellite network with maximum reliability. The historical experience

of Applicant is such that costs are approximately 10% of system capital expenses per year, or an estimated \$2.0 million per month for the STARNET system. Applicant anticipates a payroll of nearly 100 persons, and nearly 35,000 square feet of leasehold space. Applicant has determined that this \$2.0 million per month budget will sufficiently cover all operating expenses with a reasonable contingency reserve as well.

3. Projected Revenue Requirements

Applicant's revenue requirements are calculated as its investment in the space and control segment, depreciated over five years, plus its annual operating expense budget. Additional variable expenses do not exist because Applicant intends to sell all of its capacity to end-market organizations, and its operating expense budget is sized to fifth year requirements.

Dividing Applicant's \$197 Million capital outlay budget by its five year life before satellite replacement begins, yields a figure of \$39 Million per year in revenue requirements to cover capital expenditures. In addition, \$24 Million per year in operating expenses are forecast. Hence, total revenue requirements are \$63 Million per year.

4. Source of Funds

Applicant will obtain its revenue requirement funds by pre-selling its STARNET capacity in individually-negotiated transactions to major customer organizations such as automobile manufacturers, environmental technology firms, recreational electronics companies, and mobile communications suppliers. At an average price of \$1 Million per 1 Million Transmission (MT) Units of capacity, Applicant's revenue requirements will be funded at 57% of its 100 MT units of annual capacity. This is reasonably within the breakeven experience of most other satellite service companies.

The funds for Applicant's capital expenditures will come from public and private capital markets, including the major sources of equity, debt and project financing. Applicant believes it will have no problem obtaining the necessary capital in light of its affiliates' 11-year history of balanced LEO MSS operations.

At this juncture, it is prudent for Applicant to note that it is applying for authority to construct a satellite system that will operate in spectrum that has yet to be allocated, and for which application standards — including the standard that will be employed to gauge an applicant's financial qualifications — remain unannounced. Past precedent would indicate that the Commission will most likely require applicants to show that they possess the current financial ability to meet the costs of construction and launch, and operating expenses for one year after launch, either before the construction permit is granted or at some specified point thereafter. See Establishment of Satellite Systems Providing International Communications, supra, 101 F.C.C.2d at 1165; Amendment to the Commission's Rules to Allocate Spectrum for, and to Establish Other Rules and Policies Pertaining to, a Radiodetermination Satellite Service, 104 F.C.C.2d 650 (1986). Until such time as a standard is adopted, however, Applicant cannot know with any certainty what guidelines the Commission will adopt.

See Aeronautical Radio, Inc., 4 FCC Rcd 6067, 6069 (1989) (construction permit applicant in service for which Commission had yet to adopt financial standard should not have been dismissed for failing to comply with an as-yet unadopted financial standard).

Here, Applicant has supplied the Commission with the estimated costs of the proposed construction and launch of its STARCOM system (along with other initial expenses for the proposed space station); estimated operating costs for one year after launch of the STARCOM system; and stated the potential sources of funding for its proposed system. While Applicant believes that such a showing would satisfy the "first-stage" showing required of separate international satellite system applicants, and warrant a finding that Applicant is qualified to receive

a conditional construction permit, Applicant stands prepared to comply with whatever financial qualifications standard the Commission deems appropriate for application for this new and unproven, but extremely promising, new service.

